



Improving Low Visibility Operations

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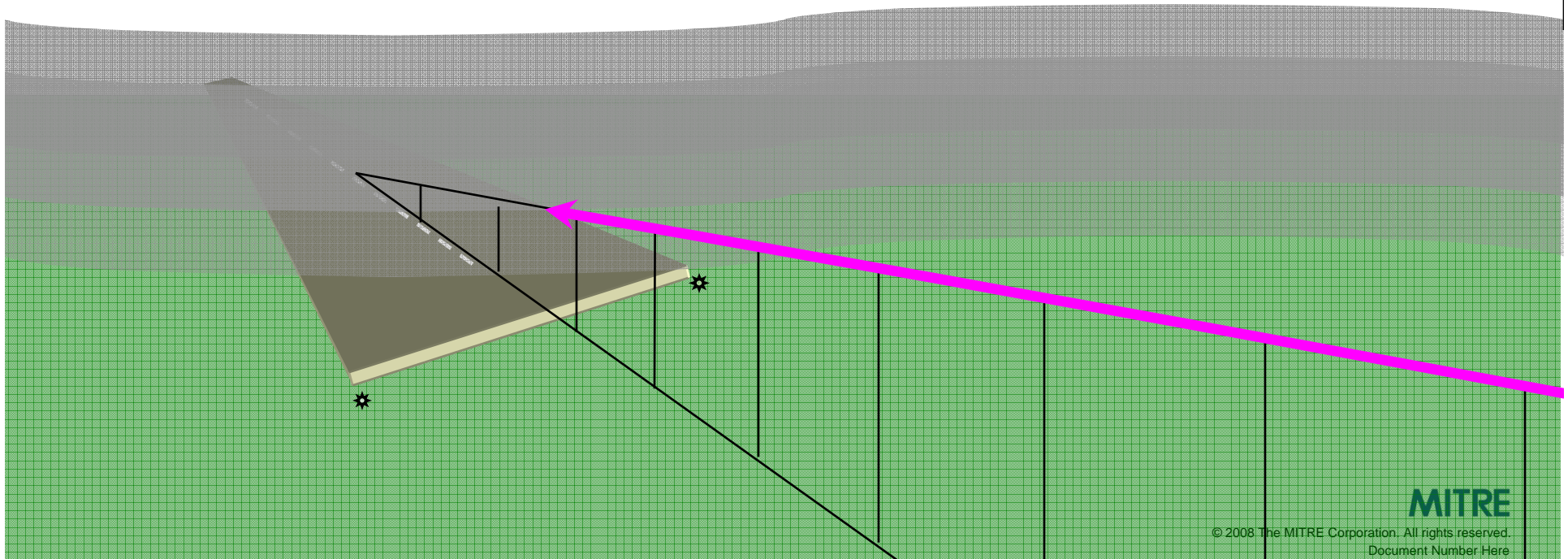
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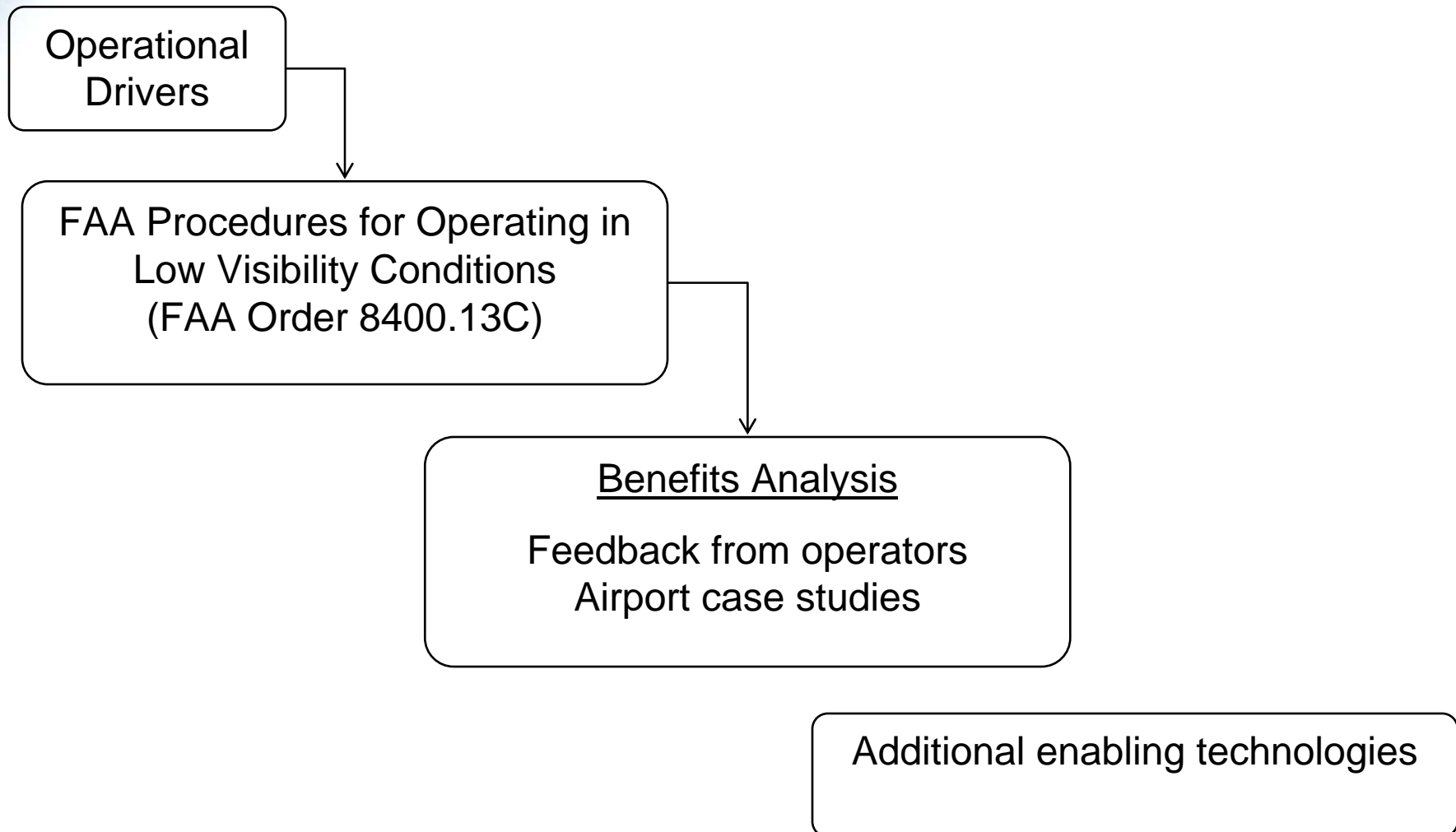


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Case Number 08-0694

Overview

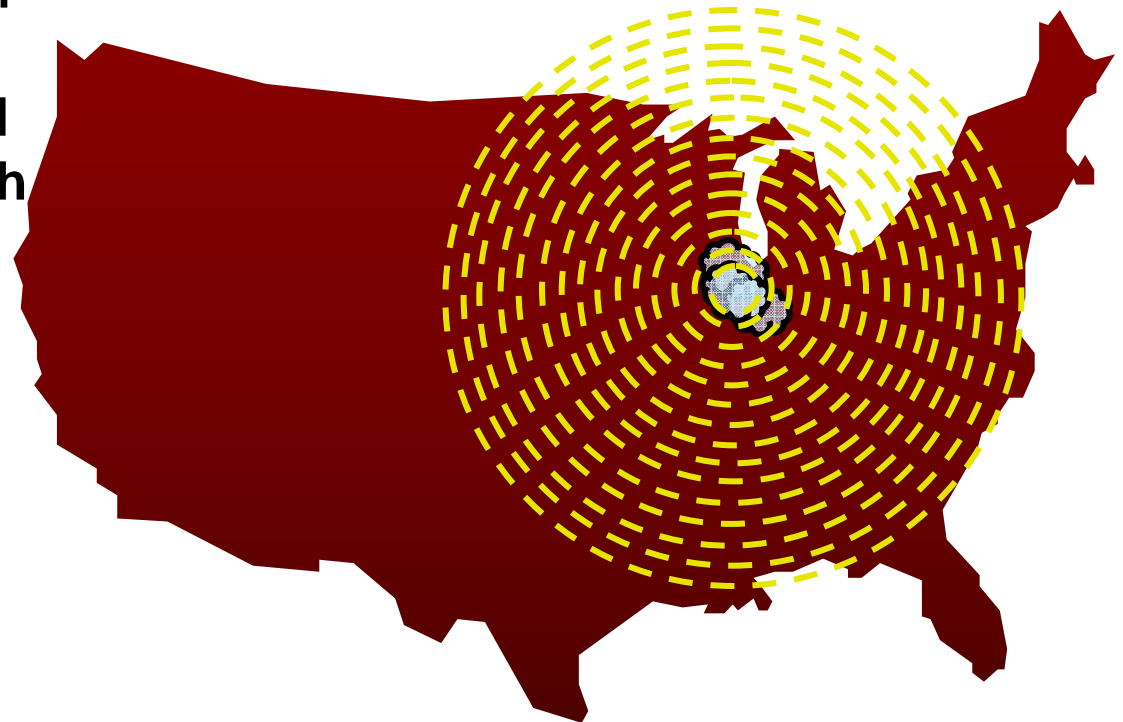




Operational Drivers



- Average industry propagation effect for low visibility affected flights (RVR < 2400 ft) is ~4-5 segments*
- Average cost of a flight hour is ~\$5K. A diversion to an alternate 1 hour away would be around \$10K (1 hour each way). Ground transfer of passengers not included*



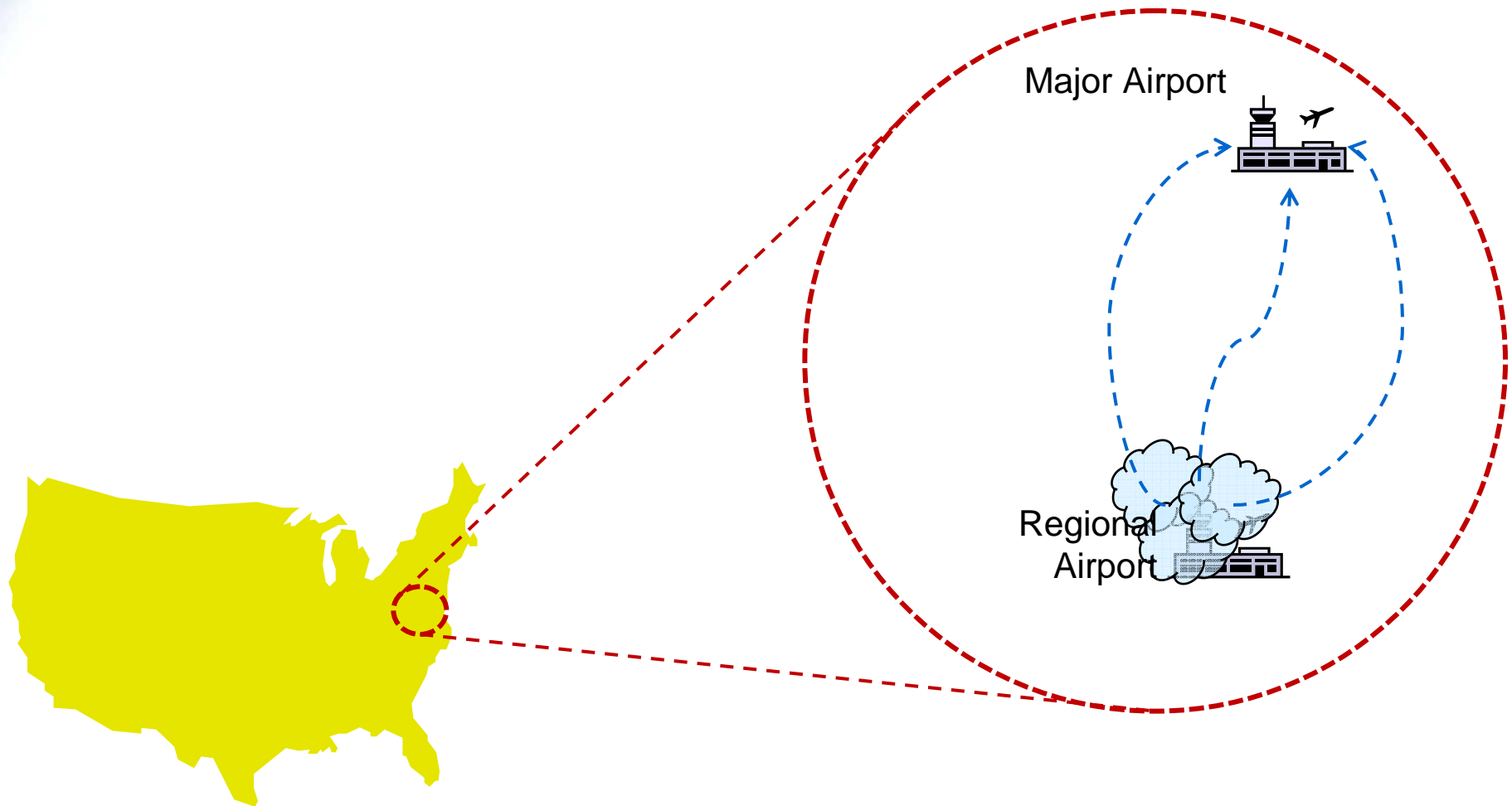
* Air Transport Association (ATA)

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Operational Drivers





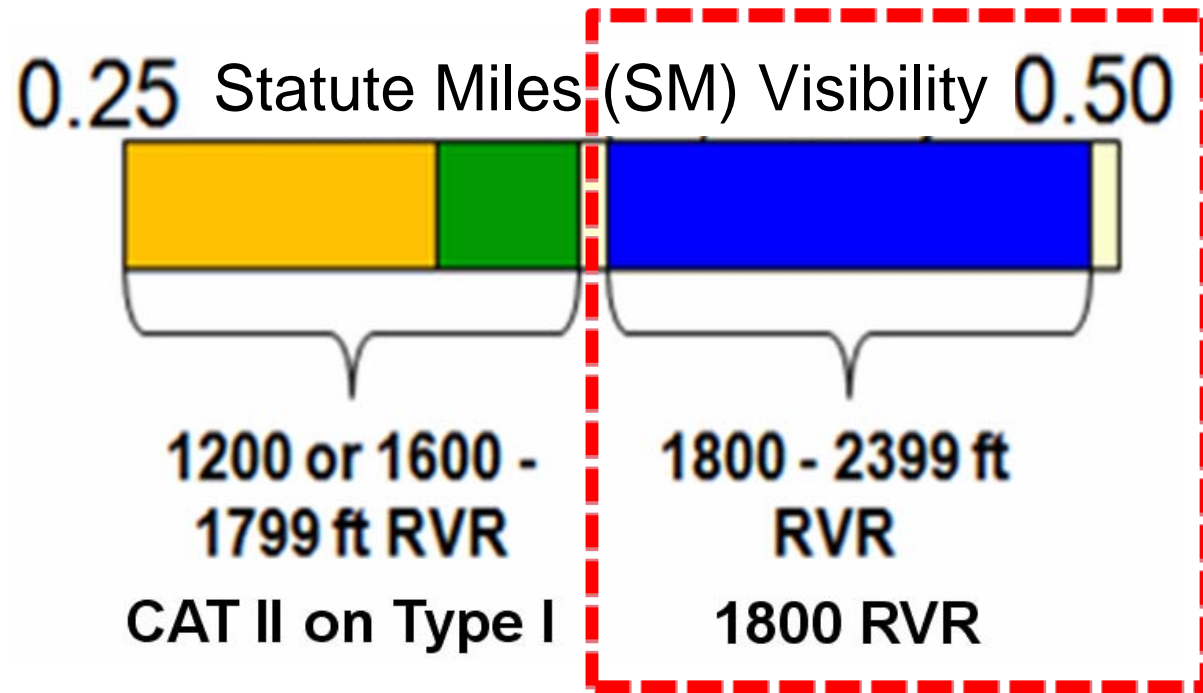
FAA Order 8400.13C

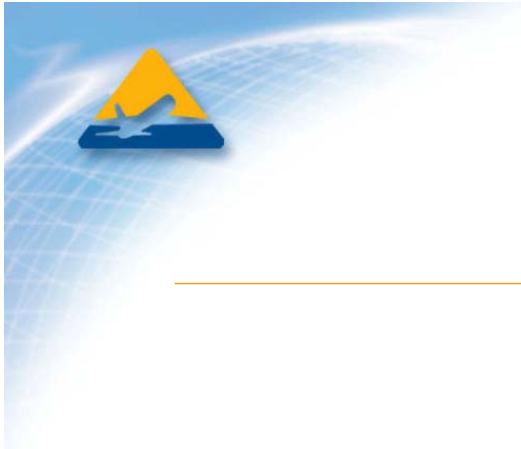


- **CAT I operations to 1800 ft RVR minimums in lieu of Touchdown Zone (TDZ) or Center Line (CL) lighting**
- **CAT II approach minimums (100 ft decision altitude (DA) and 1200 ft RVR) on runways with Type I ILS facilities in lieu of dual localizer and glideslope transmitters, runway TDZ or CL and approach lighting systems (ALSF-1 and 2), landline communications with monitoring equipment, and localizer far field monitors**



Benefits Range





Feedback from Operators (1800 RVR)

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Operator Feedback



- **Feedback was requested from a wide range of operators**
- **Operators were provided a list of candidate airports and asked to rank the level of importance to their airline**
- **15 operators responded**



Operator Feedback: Priority Lists for 1800ft Eligible Airports



**Airport NEEDS
RVR**

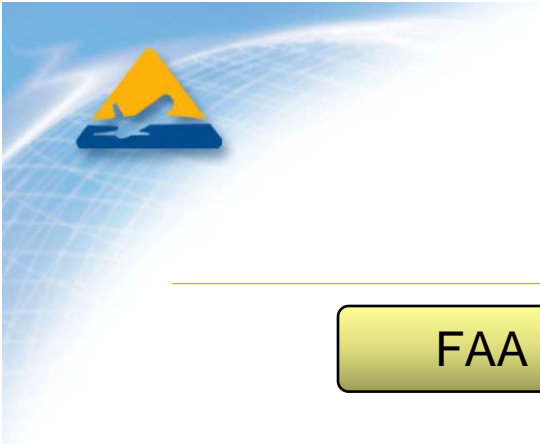
Airport ID	Airport Location	Number of Operators* who voted to prioritize Airport
KSTL	ST LOUIS	13
KCMH	COLUMBUS	12
KIAD	WASHINGTON	12
KIND	INDIANAPOLIS	12
KBWI	BALTIMORE	11
KDEN	DENVER	11
KDTW	DETROIT	11
KJAX	JACKSONVILLE	11
KRDU	RALEIGH/DURHAM	11
KSAT	SAN ANTONIO	11
KTPA	TAMPA	11
KCLT	CHARLOTTE	10
KGRR	GRAND RAPIDS	10
KGSO	GREENSBORO	10
KMCI	KANSAS CITY	10
KMKE	MILWAUKEE	10
KORD	CHICAGO	10



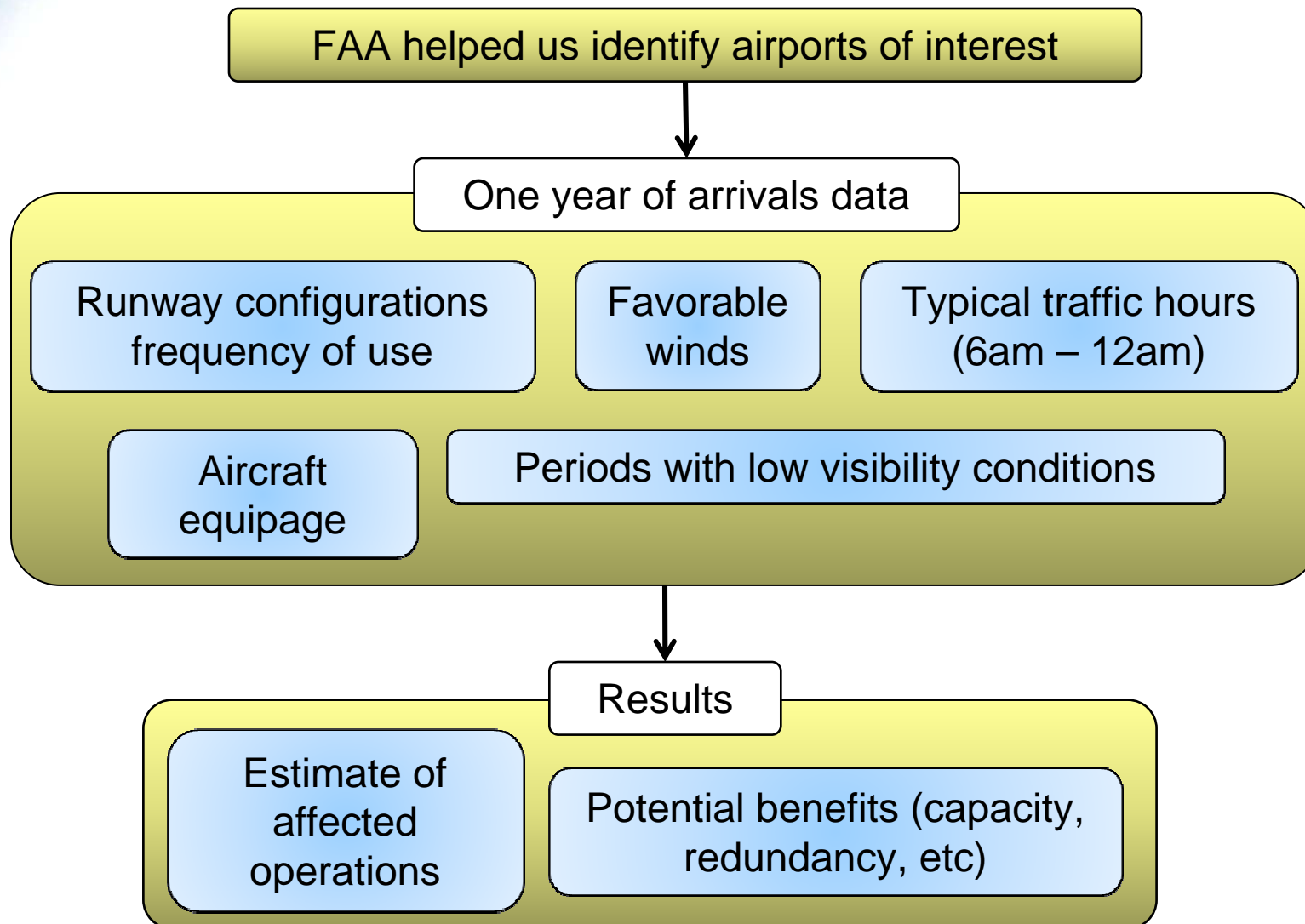
Benefits Analysis of FAA Order 8400.13C (Airport Case Studies)

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Analysis Overview





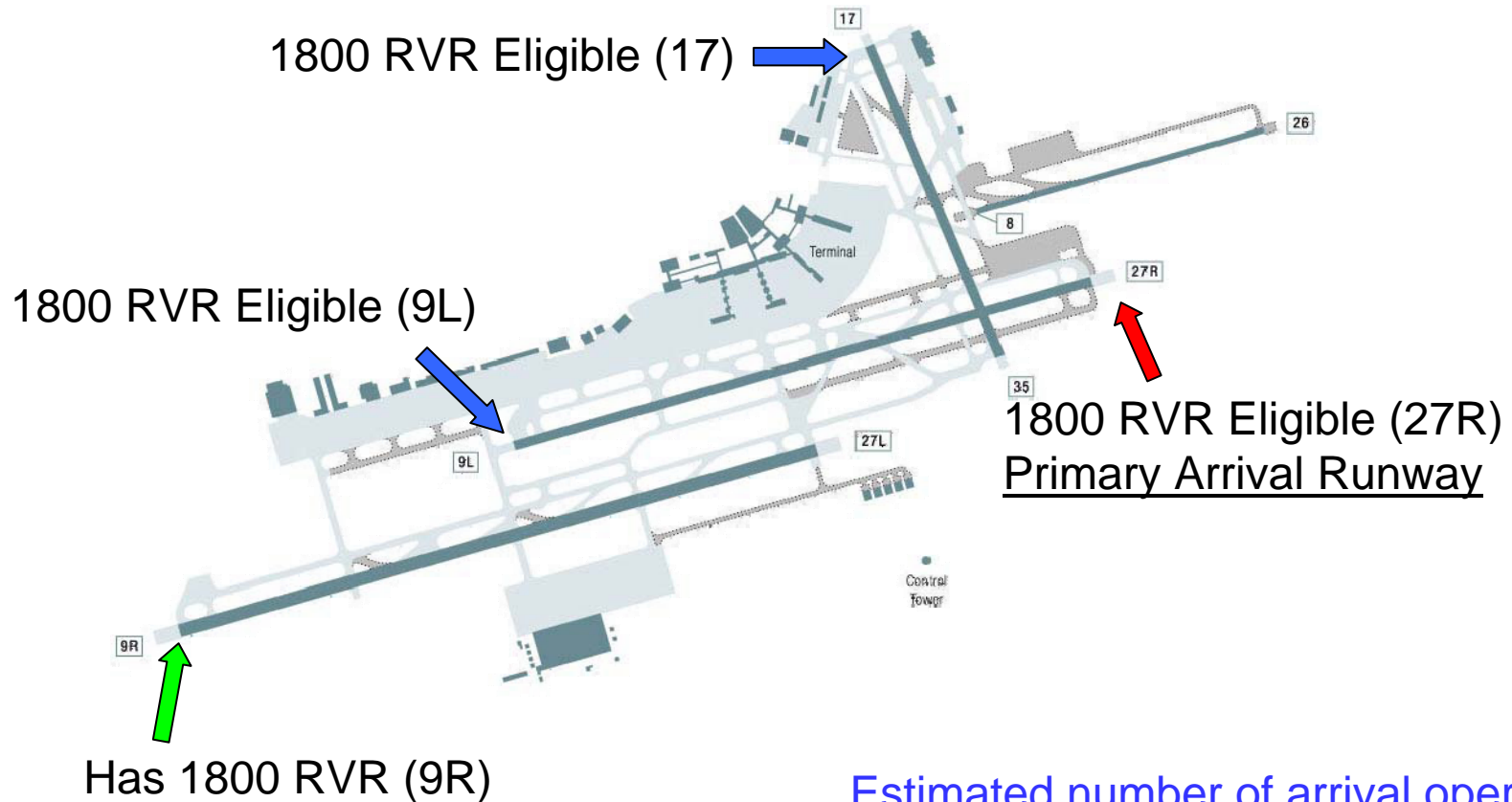
Airport Case Studies (1800 ft RVR)

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Philadelphia International Airport (KPHL) Case Study Airport Layout



Estimated number of arrival operations affected per year: ~158 (~ 5 hours)





Benefits for Airports with Existing 1800 RVR Capability



- **Airports with similar benefit potential:**

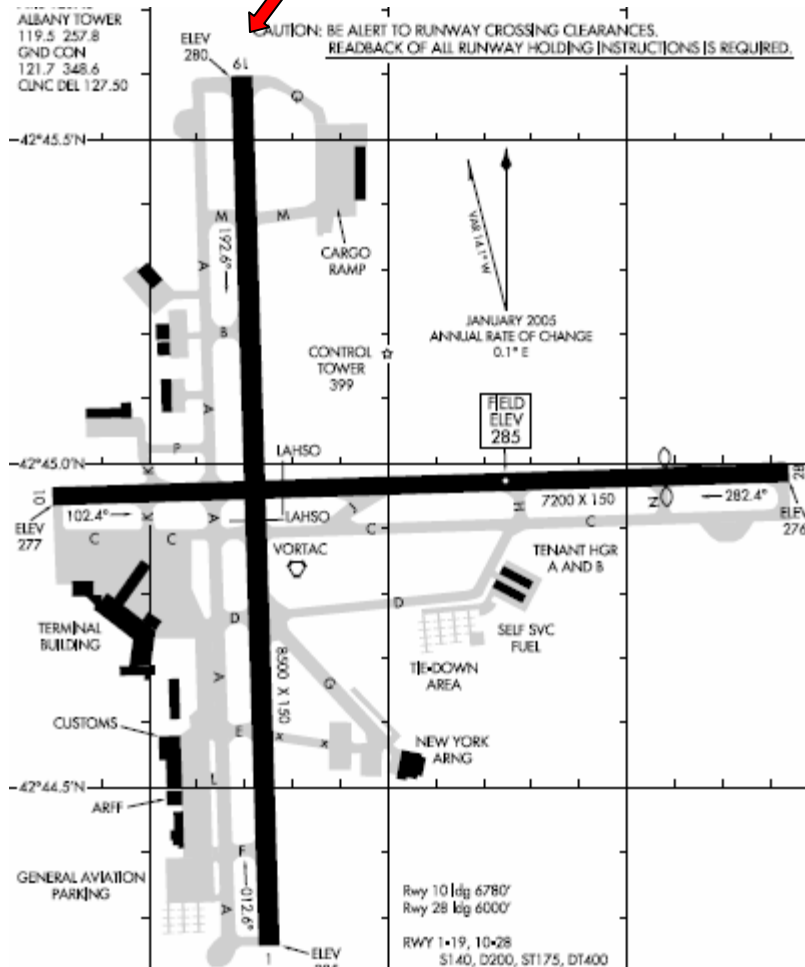
Currently has a Single 1800 RVR Rwy	Currently has Multiple 1800 RVR Rwys
Dayton (KDAY)	Indianapolis (KIND)
Providence (KPVD)	Charlotte (KCLT)
	New York (KJFK)



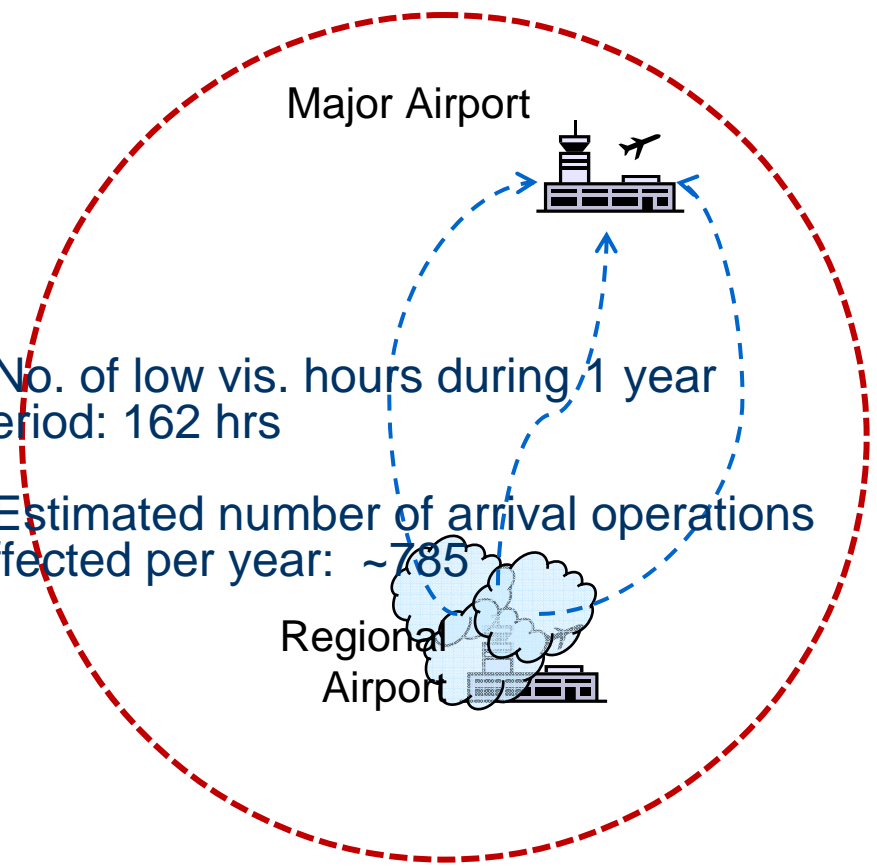
Albany International Airport (KALB) Case Study Airport Layout



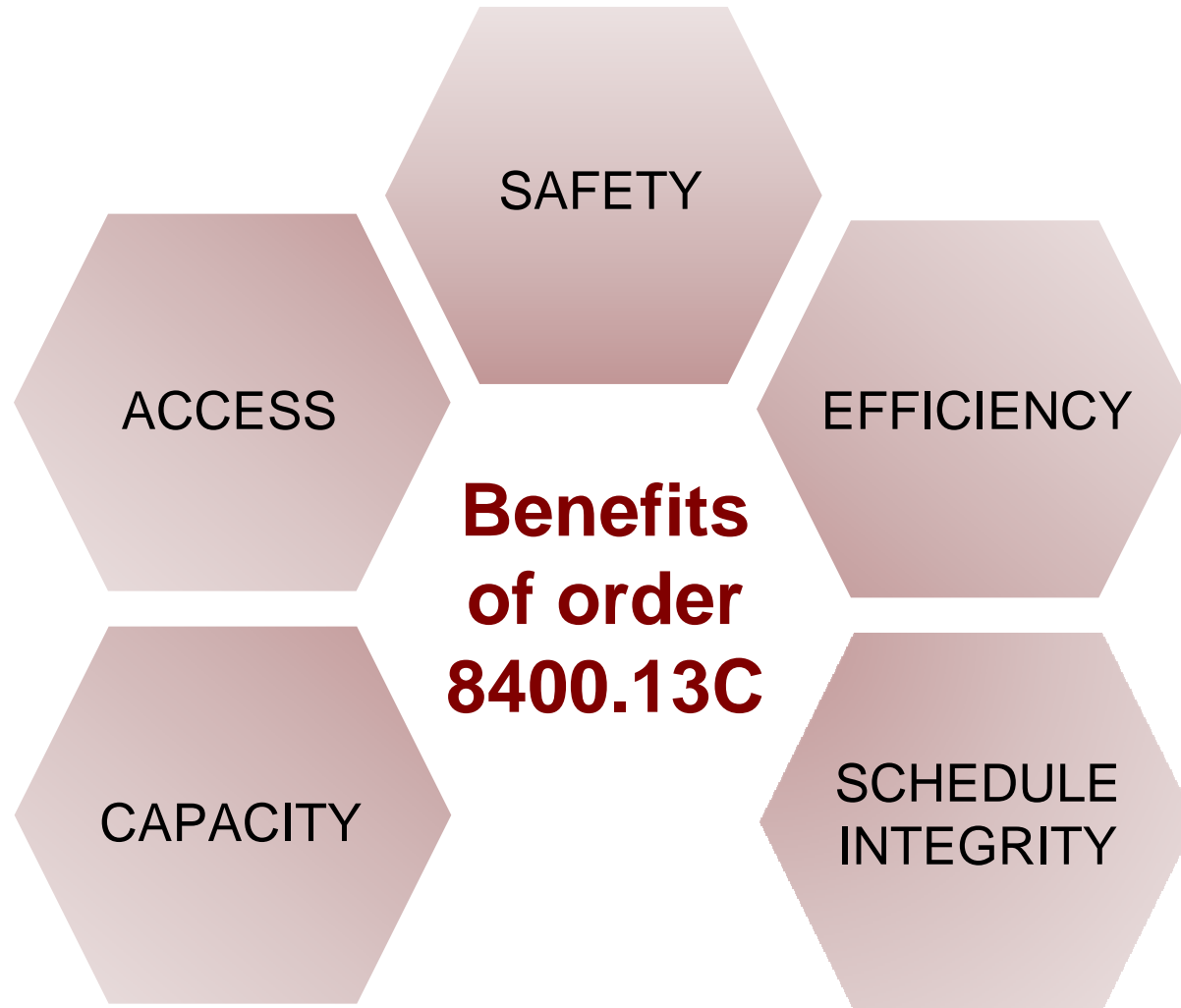
1800 RVR Eligible (Runway 1)



- No. of low vis. hours during 1 year period: 162 hrs
- Estimated number of arrival operations affected per year: ~785



Summary



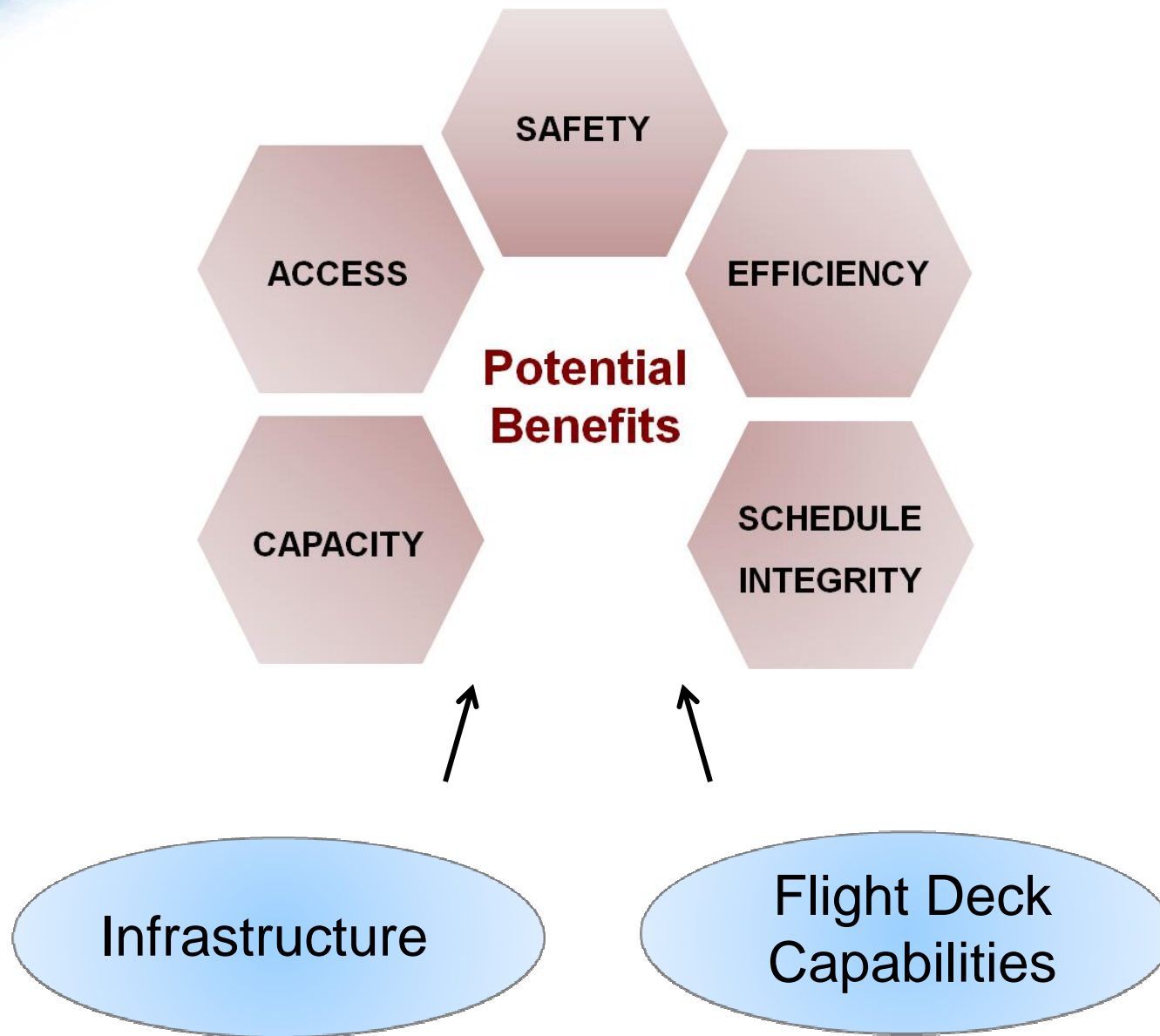
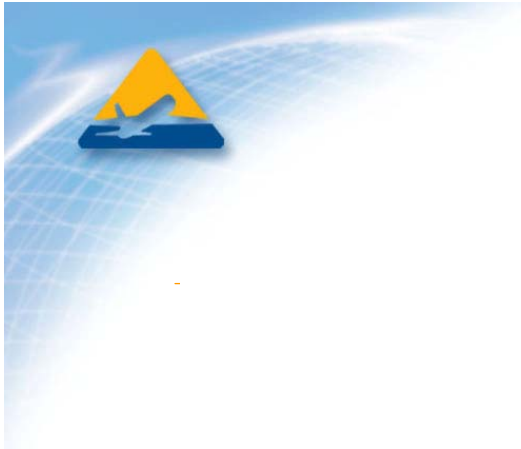
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Additional Enabling Flight Deck Technologies

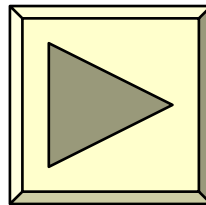
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Enhanced Flight Vision Systems





CENTER FOR ADVANCED AVIATION SYSTEM DEVELOPMENT (CAASD)



Thank You

Questions?



Backup slides

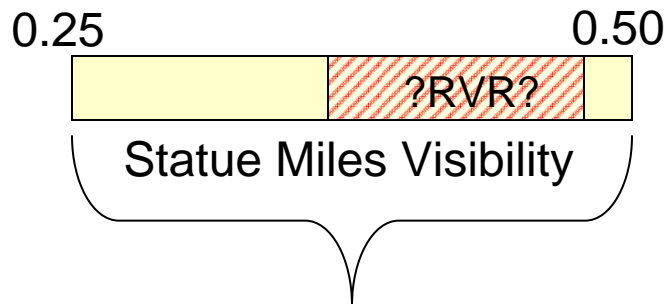




Weather Data Analysis Considerations Automated Weather Observation System (AWOS) Visibility vs. RVR Reports

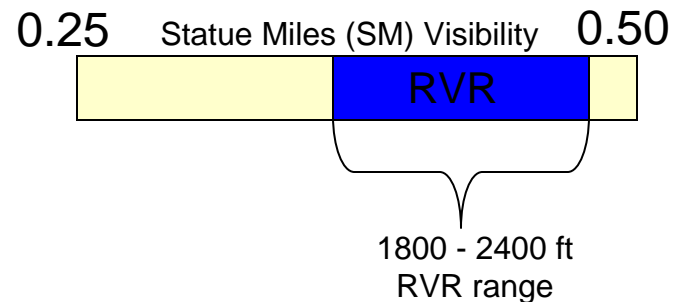


Airport A Visibility Reports *Only*



Example data = 0.80 %
visibility reported in this
range over one year

Airport B Visibility and RVR Reports



RVR was reported in the 1800-2400 ft
range **25%** of the time when the
visibility was also reported between
0.25 and 0.50 SM

*We then estimated RVR for airports that only
reported visibility*
*Example data = 0.80% * 25% = 0.16 % estimated*



Category II Operations on Type I Runways Analysis (OEP Airports)



Case Study Summary



Apt	Eligible Runways	Existing Cat II runways (RVR)	Cat III capable A/C only		All A/C	
			Est number of arrival operations during low vis time periods that could have used rwy (arrival ops/year)	Potential for improved access/ capacity increase (arrival ops/year)	Est number of arrival operations during low vis time periods that could have used rwy (arrival ops/year)	Potential for improved access/ increase throughput (arrival ops/year)
EWR	22L	4R (12)	48.8	6.4	106.2	13.9
IAD	12, 19L	1R (12), 19R (12)	33.2	0	195.1	0
JFK	31R	4R (12), 13L (16), 22L (12)	407.4	0	608.0	0
PHL	27R	9R (12)	612.0	30.6	1224.0	61.2
PIT	28R, 28L	10L (12), 10R (12)	49.9	16.4	178.2	58.5



Case Studies for CAT II on Type I



Airport	Eligible RWY	Existing CAT II RWYS	CAT III Aircraft	
			# of arrival ops that could have used eligible RWY during low vis (1 yr)	Potential for additional capacity
EWR	22L	4R	48.8	6.4
IAD	12,19L	1R 19R	33.2	0
JFK	31R	4R 13L 22L	407.4	0
PHL	27R	9R	612	30.6
PIT	28R 28L	10L 10R	49.9	16.4



8400.13C

Aircraft and Flight Crew Requirements



- **CAT I 1800 RVR**
 - Aircraft equipped with an operable flight director (FD), or FD with an autopilot approach coupler, or HUD which is certified for operation to a minimum of 200 ft Height above Touchdown (HAT) are eligible for this operation Auto-land or HUD used through touchdown
- **CAT II on Type I**
 - Aircraft and flight crews certified for CAT III Operations
 - Auto-land or HUD used through touchdown



Philadelphia International Airport (KPHL) Case Study Benefits for Airports with Existing 1800 RVR Capability



- Highest capacity and most commonly used runway configuration (27R) does not support arrival ops below 2400 RVR
- During low visibility conditions, a configuration change to utilize runway 9R is likely required
 - Less efficiency in terms of arrival capacity
 - Less efficiency in terms of controller familiarity
- Only one runway option exists for low visibility arrivals. Runway closures possible
 - Unfavorable wind conditions – (winds from west 3x more common)
 - Maintenance
- **Estimated number of arrival operations affected per year: ~158**



Specific Airport Case Studies Selection Criteria



- **CAT I approaches at 1800 RVR (KPHL, KALB)**
 - At least 1 site with existing 1800 RVR landing capabilities
 - At least 1 site that currently does not have existing runways approved for CAT I approaches at 1800 RVR
- **CAT II with a Type I ILS (KIAD, KPIT, KJFK, KEWR, KPHL)**
 - Site selection should focus on OEP airports in the Northeast U.S.
 - Sites that receive at least 100 arrival operations per day
- **Sites with a high occurrence of low visibility hours, as they would be most likely to use this capability.**



Albany International Airport (KALB) Case Study

Benefits for Airports without Existing 1800 RVR Capabilities



- **Background**
 - Runway 1 is eligible for 1800 RVR, needing only a published plate
 - No. of low vis. hours (visibility < 0.50 SM) during 1 year period: **162 hrs**
 - During these hours, winds were favorable for landing on Rwy 1 97% of the time (METAR)
 - Average number of daily arrival operations: 117.1
- **Potential Issues**
 - No landing options when visibility drops below 2400 RVR
 - Estimated number of arrival operations affected per year: **~785 (this number is based on comparing KALB's arrival rates during weather conditions that are below 2400 ft but above 1800 ft RVR that occurred during the past year)**
- **Potential Benefits**
 - Provides airport access during periods of low visibility (1800-2400 RVR) that would otherwise not be possible